The specification has been amended to place the subject application in better form. A new abstract has also been presented in accordance with preferred practice. Further, by separate paper, Applicants have requested approval to amend Figures 3 and 13 to correct minor informalities. No new matter has been added by these changes.

Claims 25-48, 60-63 and 76-101 are presented for consideration. Claims 25, 37, 60, 62, 76, 79, 82, 84, 88, 94 and 100 are independent. Claims 1-24, 49-59 and 64-75 have been canceled without prejudice or disclaimer. Claims 60 and 62 have been amended to clarify features of the invention, while claims 76-101 have been added to recite additional features of the invention. Support for these changes and claims can be found in the application, as filed. Therefore, no new matter has been added.

Applicants request favorable reconsideration and withdrawal of the objections set forth in the above-noted Office Action.

The Examiner objected to the drawings on formal grounds. Specifically, the Examiner requested that the opening/closing door located on the closed vessel and the vent hole that opens/closes freely must be shown in the drawings or the feature canceled from the claims. To expedite prosecution, Applicants have canceled claims 12 and 13, which previously recited these features, without prejudice or disclaimer. Applicants submit that this change obviates the need for this drawing correction.

The Examiner also noted that two components in Figure 3 were labeled with reference numeral "111." To expedite prosecution, Applicants, by separate paper, request approval to correct Figure 3 by correctly renumbering the interferometer by reference numeral 113, rather

than the current designation of topmost reference numeral 111. Applicants submit that this change likewise overcomes this portion of the objection to the drawings. Such favorable indication is requested.

The Examiner objected to claim 74 due to an informality. Specifically, the Examiner asserted that claim 74 is a duplicate of claim 72. To expedite prosecution, Applicants have renumbered these claims accordingly. In particular, claim 72 is now presented as new independent claim 82, whereas claim 74 is now presented claim 85, depending from new independent claim 84. Applicants submit that these changes obviate this objection, as well.

Applicants note with appreciation that claims 25-48 and 60-63 have been allowed over the art of record. Applicants submit that the minor changes to claims 60 and 62 do not affect the allowability of those claims. Therefore, claims 25-48 and 60-63 should remain allowable at the outset.

Applicants further note with appreciation that claims 7, 8, 50, 51 and 72-75 were indicated as being allowable, if rewritten in independent form. To expedite prosecution, claim 7 has rewritten as new independent claim 76, claim 50 has been rewritten as new independent claim 79, claim 72 has been rewritten as new independent claim 82, and claim 73 has been rewritten as new independent claim 84. Applicants submit, therefore, that independent claims 76, 79, 82 and 84, with claims 77, 78, 80, 81, 83 and 85-87 variously depending therefrom, should likewise be deemed allowable at the outset. In addition to these claims being allowable, Applicants submit that new claims 88-101 patentably define features of the subject invention.

Therefore, Applicants request favorable reconsideration and withdrawal of the rejections set forth in the above-noted Office Action.

Turning now to the art rejections, claims 1, 2, 6, 9, 11, 13-24, 49 and 53-59 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,252,648 to Hase et al. Claims 3-5 and 71 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 4,964,940 to Auvert et al. Claim 10 was rejected under 35 U.S.C. § 103 as being unpatentable over the Hase et al. patent in view of U.S. Patent No. 6,341,006 to Murayama et al. Claims 12 and 52 were rejected under 35 U.S.C. § 103 as being unpatentable over the Hase et al. patent in view of U.S. Patent No. 6,295,121 to Nakamura. Claims 64-70 were rejected under 35 U.S.C. § 103 as being unpatentable over the Hase et al. patent in view of U.S. Patent No. 6,385,497 to Ogushi et al. Applicants submit that the cited art, whether taken individually or in combination, does not teach many features of the present invention as previously recited in these claims. Therefore, these rejections are respectfully traversed. Nevertheless, Applicants submit that new claims 88-101, for example, amplify the distinctions between the present invention and the cited art.

Independent claims 88, 94 and 100 recite various aspects various aspects of the exposure apparatus of the present invention. These claims recite, among other features, a chamber which incorporates an optical element, a closed vessel which surrounds the chamber, and a member which supports the chamber. Independent claim 88 defines that the member is coupled to the closed vessel via a movable displacement adjusting member and that the member has a region which passes through the closed vessel. Independent claim 94 recites that the supporting member is coupled to the closed vessel via a bellows. Independent claim 100 recites that the

supporting member is coupled to the closed vessel via deformable member. Applicants submit that the cited art does not teach or suggest such features of the present invention, as recited in those independent claims.

The Hase et al. patent relates to an exposure apparatus that has barrels 2h and 2i which incorporate optical elements 2a and 2b, with the barrels being fixed inside a casing 2g.

The Auvert et al. patent relates to a laser micro-beam machine constituted in a sealed enclosure. The machine includes displacement mechanisms 58, 60, 62 and 64 located between a reaction chamber 20 and a sealed enclosure 10.

The Murayama et al. patent discloses a configuration of a "window" in a projection exposure apparatus.

The Nakamura patent discloses a configuration of doors 5C and 5D in an exposure apparatus.

The Oguchi et al. patent discloses a remote maintenance system for an apparatus which is installed in a factory.

Applicants submit, however, that none of these citations, whether taken individually or in combination, teaches or suggests the salient features of Applicants' exposure apparatus of the present invention as recited in independent claim 88, 84 and 100. Therefore, Applicants further submit that the present invention likewise is patentably defined by these independent claims.

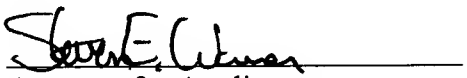
For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 76, 79, 82, 84, 88, 94 and 100, also is patentably defined over the cited art, whether that art is taken individually or in combination.

The remaining dependent claims also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicants further submit that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the objections and rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



Attorney for Applicants
Steven E. Warner
Registration No. 33,326

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

SEW/eab

APPENDIX A

IN THE ABSTRACT

[An exposure apparatus includes a chamber which incorporates an optical element and surrounds a predetermined region, a closed vessel which surrounds the chamber, and a pump for reducing the internal pressure of the chamber. The pressure of the closed vessel is also reduced when the internal pressure of the chamber is reduced.]

-- An exposure apparatus includes a chamber which incorporates an optical element and surrounds a predetermined region, a mechanism for setting an inert gas atmosphere in the chamber, and a closed vessel which surrounds the chamber. The purity of inert gas in the chamber is higher than a purity of inert gas in the closed vessel. --

IN THE SPECIFICATION:

Please substitute the paragraph beginning at page 3, line 10, with the following.

-- Only when gas replacement at a stagnation point at which gas hardly flows is progressed by molecular diffusion, does it [takes] take a very long time to decrease the concentration of gas present in the vessel from the beginning. --

Please substitute the paragraph beginning at page 5, line 15, with the following.

-- The chamber desirably incorporates at least some of the optical elements of an illumination optical unit. --

Please substitute the paragraph beginning at page 5, line 17, with the following.

-- The chamber desirably incorporates at least some of the optical elements of a projection optical unit. --

Please substitute the paragraph beginning at page 6, line 24, with the following.

-- The chamber desirably incorporates at least some of the optical elements of an illumination optical unit. --

Please substitute the paragraph beginning at page 6, line 26, with the following.

-- The chamber desirably incorporates at least some of the optical elements of a projection optical unit. --

Please substitute the paragraph beginning at page 7, line 26, with the following.

-- The chamber desirably incorporates at least some of the optical elements of an illumination optical unit. --

Please substitute the paragraph beginning at page 8, line 1, with the following.

-- The chamber desirably incorporates at least some of the optical elements of a projection optical unit. --

Please substitute the paragraph beginning at page 17, line 21, with the following.

-- A load-lock chamber 36 is used in loading/unloading the wafer 14, and comprises gate valves 37 and 38 freely opened/closed by a driving unit (not shown). A support table 39 is provided for the wafer 14. A wafer transfer robot 40 supplies/recovers a wafer to/from the wafer chuck 16. --

Please substitute the paragraph beginning at page 18, line 3, with the following.

-- A gas supply source 51 supplies nitrogen gas or helium gas as an inert gas. The two gases exhibit high transmittances with respect to an F_2 laser beam. The gas supply source 51 supplies gas hardly containing oxygen. "Gas hardly containing oxygen" means that the gas does not contain a given amount of oxygen, which greatly influences the performance of the apparatus, and means at least a lower oxygen concentration than an oxygen concentration required for the chamber 4 or the like. --

Please substitute the paragraph beginning at page 22, line 22, and ending on page 23, line 7, with the following.

-- In the first embodiment, the gas supply port 59 is formed in one end of the housing 6 on the light source side, and the gas discharge port 60 is formed in one end of the housing 6 on the reticle side. However, the ports 59 and 60 are not limited to this. For example, it may also be possible that the gas supply port is formed in one end of the housing 6 on the reticle side and the gas discharge port is formed in one end of the housing 6 on the light source side. In some cases, a port having the masking blade serving as a movable displacement adjusting member is desirably set [as] <u>at</u> a downstream side in consideration of the gas purity of the atmosphere in the housing 6. --

Please substitute the paragraph beginning at page 24, line 14, with the following.

-- A vent hole 105A communicates with the atmospheres in the chamber 4 and closed vessel. When the vacuum pump 103 forcibly discharges gas from the closed vessel 101, the interior of the closed vessel 101 changes to a reduced-pressure atmosphere, and gas in the chamber 4 is discharged to the closed vessel 101 via the vent hole 105A. At the same time as the interior of the chamber 4 is evacuated, the internal pressures of the chamber 4 and closed vessel can be set <u>to be</u> almost equal. --

Please substitute the paragraph beginning at page 24, line 24, and ending on page 25, line 6, with the following.

-- A vent hole 105B communicates with the atmospheres in the housing 6 and closed vessel. When the vacuum pump 103 forcibly discharges gas from the closed vessel 101, the interior of the closed vessel 101 changes to a reduced-pressure atmosphere, and gas in the housing 6 is discharged to the closed vessel 101 via the vent hole 105B. At the same time as the interior of the housing 6 is evacuated, the internal pressures of the housing 6 and closed vessel can be set to be almost equal. --

Please substitute the paragraph beginning at page 26, line 16, with the following.

-- The displacement mechanisms are illustrated in only the chamber 4 in Fig. 3, but are similarly arranged in the housing 6. --

Please substitute the paragraph beginning at page 30, line 12, with the following.

-- A pattern drawn on the reticle 8 is reduced and projected [on] onto the wafer 14 via lenses 402, 405, 408, 411, 414, 417, and 420. Reference numeral 401 denotes a lens barrel of these lenses. --

Please substitute the paragraph beginning at page 33, line 5, with the following.

-- A vent hole 155 communicates with the atmospheres in the projection optical unit 13 and closed vessel 151. When the vacuum pump 153 forcibly discharges gas from the projection optical unit 13, the interior of the projection optical unit 13 changes to a reduced-pressure atmosphere, and gas in the closed vessel 151 is discharged to the projection optical unit 13 via

the vent hole 155. At the same time as the interiors of the projection optical unit 13 and closed vessel 151 are evacuated, the internal pressures of the projection optical unit 13 and closed vessel 151 can be set to be almost equal. --

Please substitute the paragraph beginning at page 38, line 14, with the following.

-- A vacuum pump 153A evacuates the space between the closed vessels 151A and 151B and the projection optical unit 13, whereas a vacuum pump 153B exhausts gas from the projection optical unit 13. Similar to the above-described case, the internal pressures of the projection optical unit 13 and closed vessel 151 are set to be almost equal. Also, similar to the above-described case, it may be possible to form vent holes and attach a vacuum pump to either hole. --

Please substitute the paragraph beginning at page 38, line 23, and ending on page 39, line 1, with the following.

-- Evacuation of the closed vessels 151A and 151B may generate the internal/external pressure differences of the closed vessel 151A and 151B and may deform them. It is [unpreferable] not preferable that deformation of the closed vessels 151A and 151B influence the projection optical unit 13. --

Please substitute the paragraph beginning at page 41, line 18, with the following.

-- Although not shown, the gas circulation unit 72 comprises a chemical filter for removing an impurity in the gas from the inlet port. --

Please substitute the paragraph beginning at page 43, line 11, with the following.

-- This arrangement can always control the internal pressure of the chamber 26 to be constant. Accordingly, optical characteristics readily influenced by variations in pressure, e.g., the performance of the projection optical unit 13 (Fig. 1) can be maintained. --

Please substitute the paragraph beginning at page 44, line 12, with the following.

-- Gas is supplied at a timing when the gate valves 32 and 37 are opened, a reticle and wafer are placed on the support tables 34 and 39, the gate valves 32 and 37 are closed, and the valve (not shown) of the gas supply source and the valve (not shown) of the discharge mechanism 86 are opened in accordance with an instruction from the controller 78. --

Please substitute the paragraph beginning at page 45, line 27, and ending on page 46, line 1, with the following.

-- A discharge port 87 is provided for discharging gas from the chamber 26. --

Please substitute the paragraph beginning at page 47, line 17, with the following.

-- The embodiment of Fig. 1 uses the movable displacement adjusting members 27, 28, and 29, which can prevent direct influence of deformation of an adjacent building component even if the chambers 4 and 26 [deforms] deform in a vacuum. --

Please substitute the paragraph beginning at page 47, line 22, and ending on page 48, line 6, with the following.

-- A series of gas supply operations after evacuating the interiors of the chambers and load-lock chambers may be repeated a plurality of number of times, as needed. When evacuation is repeated a plurality of number of times, the ultimate degree of vacuum in the chambers and load-lock chambers suffices to be relatively lower (higher absolute pressure) than that in only one evacuation. This can greatly reduce the costs of vacuum pumps and vacuum components. According to the replacement method of the present invention, it is desirable to introduce helium after the end of the last evacuation and to use nitrogen for a preceding purge. --

Please substitute the paragraph beginning at page 51, line 4, with the following.

-- In the second embodiment, the chamber 4 and housing 6 which constitute the illumination optical unit are supported by the illumination unit surface plate [1022(Fig. 14)] 1022 (Fig. 14). The illumination unit surface plate 1022 may be integrated with the lens barrel surface [22(refer to Fig. 7, in the first embodiment)] 22 (refer to Fig. 7, in the first embodiment), which holds the projection optical unit 13. --

Please substitute the paragraph beginning at page 51, line 11, with the following.

-- Moreover, in the second embodiment, the closed vessel [101(Fig. 14)] 101 (Fig. 14) may be formed with the same constitution of the closed vessel 151A and [151B(refer to Fig. 7, in the first embodiment)] 151B (refer to Fig. 7, in the first embodiment). --

Please substitute the paragraph beginning at page 51, line 15, with the following.

-- Furthermore, the constitution which surrounds the chamber with the closed vessel, is not limited to the object units, i.e., the projection optical unit and the illumination unit. For instance, it is possible that the reticle stage unit and the wafer stage unit are applied as object units. And the closed vessel, for the reticle stage unit and the wafer stage unit, may be formed with the same constitution of the closed vessel 151A and 151B. --

Please substitute the paragraph beginning at page 51, line 25, and ending on page 52, line 6, with the following.

-- A production system for producing a semiconductor device (e.g., a semiconductor chip such as an IC or an LSI, a liquid crystal panel, a CCD, a thin-film magnetic head, a micromachine, or the like) will be exemplified. A trouble remedy or periodic maintenance of a manufacturing apparatus installed in a semiconductor manufacturing factory, or maintenance service such as software distribution is performed by using a computer network outside the manufacturing factory. --

Please substitute the paragraph beginning at page 52, line 7, and ending on page 53, line 3, with the following.

-- Fig. 9 shows the overall system cut out at a given angle. In Fig. 9, reference numeral 1101 denotes a business office of a vendor (apparatus supply manufacturer) which provides a semiconductor device manufacturing apparatus. Assumed examples of the manufacturing apparatus are semiconductor manufacturing apparatuses for performing various processes used in a semiconductor manufacturing factory, (e.g., a lithography apparatus including an exposure apparatus, a resist processing apparatus, and an etching apparatus, an annealing apparatus, a film formation apparatus, a planarization apparatus, and the like) and post-process apparatuses (e.g., an assembly apparatus, an inspection apparatus, and the like). The business office 1101 comprises a host management system 1108 for providing a maintenance database for the manufacturing apparatus, a plurality of operation terminal computes 1110, and a LAN (Local Area Network) 1109 which connects the host management system 1108 and computers 1110 to construct an intranet. The host management system 1108 has a gateway for connecting the LAN 1109 to Internet 1105 as an external network of the business office, and a security function for limiting external accesses. --

Please substitute the paragraph beginning at page 55, line 9, with the following.

-- In Fig. 10, reference numeral 1201 denotes a manufacturing factory of a manufacturing apparatus user (semiconductor device manufacturer) where manufacturing apparatuses for performing various processes, e.g., an exposure apparatus 1202, a resist processing apparatus

1203, and a film formation apparatus 1204 are installed in the manufacturing line of the factory. Fig. 10 shows only one manufacturing factory 1201, but a plurality of factories are networked in practice. --

Please substitute the paragraph beginning at page 56, line 3, with the following.

-- The host management system 1205 for managing the apparatuses in the manufacturing factory of the user, and the management systems 1211, 1221, and 1231 of the vendors for the respective apparatuses are connected via the Internet or dedicated-line network serving as an external network 1200. If [a] trouble occurs in any one of a series of manufacturing apparatuses along the manufacturing line in this system, the operation of the manufacturing line stops. This trouble can be quickly solved by remote maintenance from the vendor of the apparatus in trouble via the Internet 1200. This can minimize the [stop] stoppage of the manufacturing line. --

Please substitute the paragraph beginning at page 57, line 23, and ending on page 58, line 24, with the following.

-- A semiconductor device manufacturing process using the above-described production system will be explained. Fig. 12 shows the flow of the whole manufacturing process of the semiconductor device. In step 1 (circuit design), a semiconductor device circuit is designed. In step 2 (creation of exposure control data), exposure control data of the exposure apparatus is created based on the designed circuit pattern. In step 3 (wafer manufacture), a wafer is manufactured using a material such as silicon. In step 4 (wafer process) called a pre-process, an

actual circuit is formed on the wafer by lithography using a prepared mask and the wafer. Step 5 (assembly) called a post-process is the step of forming a semiconductor chip by using the wafer manufactured in step 4, and includes an assembly process (dicing and bonding) and packaging process (chip encapsulation). In step 6 (inspection), inspections such as [the] an operation confirmation test and a durability test of the semiconductor device manufactured in step 5 are conducted. After these steps, the semiconductor device is completed and shipped (step 7). The pre-process and post-process are performed in separate dedicated factories, and maintenance is done for each of the factories by the above-described remote maintenance system. Information for production management and apparatus maintenance is communicated between the pre-process factory and the post-process factory via the Internet or dedicated-line network. --

Please substitute the paragraph beginning at page 58, line 25, and ending on page 59, line 20, with the following.

-- Fig. 13 shows the detailed flow of the wafer process. In step 11 (oxidation), the wafer surface is oxidized. In step 12 (CVD), an insulating film is formed on the wafer surface. In step 13 (electrode formation), an electrode is formed on the wafer by vapor deposition. In step 14 (ion implantation), ions are implanted in the wafer. In step 15 (resist processing), a photosensitive agent is applied to the wafer. In step 16 (exposure), the above-mentioned exposure apparatus bakes and exposes the circuit pattern of a mask on the wafer. In step 17 (developing), the exposed wafer is developed. In step 18 (etching), the resist is etched except for the developed resist image. In step 19 (resist removal), an unnecessary resist after etching is

removed. These steps are repeated to form multiple circuit patterns on the wafer. A manufacturing apparatus used in each step undergoes maintenance by the remote maintenance system, which prevents [a] trouble in advance. Even if [a] trouble occurs, the manufacturing apparatus can be quickly recovered. The productivity of the semiconductor device can be increased in comparison with the prior art. --

Please substitute the paragraph beginning at page 59, line 21, with the following.

-- [The] In one aspect, the exposure apparatus [defined in claim 1] of the present invention can suppress deformation of a chamber upon reducing the internal pressure of the chamber having an optical element. --

Please substitute the paragraph beginning at page 59, line 25, with the following. -- [The] In another aspect, the exposure apparatus [defined in claim 21] of the present invention can keep the purity of inert gas in the chamber high. --

Please delete the paragraph beginning at page 60, line 1, in its entirety.

-- [The exposure apparatus defined in claim 33 of the present invention can keep the purity of inert gas in the chamber high.]

IN THE CLAIMS

60. (Amended) A gas replacement method comprising the steps of:

supplying inert gas into a chamber which incorporates an optical element;

supplying inert gas into a closed vessel which surrounds the chamber; and

controlling a purity of the inert gas in the chamber to be higher than a purity of the inert gas in the closed vessel.

62. (Amended) A gas replacement method comprising the steps of:

supplying inert gas into a chamber which incorporates an optical element;

supplying inert gas into a closed vessel which surrounds the chamber; and

controlling a pressure of the inert gas in the chamber to be higher than a pressure of the inert gas in the closed vessel.